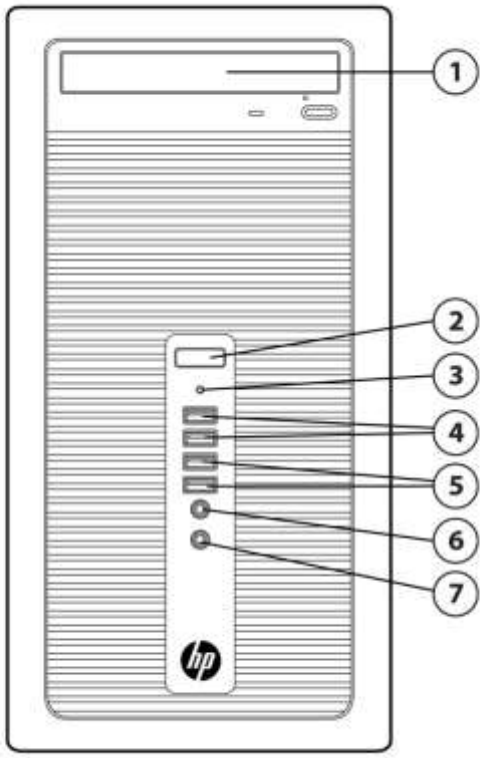
Overview

HP ProDesk 405 G1 Microtower Business PC



1. Drive bay supporting an optical disk drive (optional)
2. Power button
3. PC status LED
4. (2) USB 2.0 ports (black)
5. (2) USB 3.0 ports (blue)
6. 3.5mm microphone jack
7. 3.5mm headphone output

Not Shown

5.25” External Drive Half-Height Drive Bay (located behind removable bezel)
3.5” external drive bay; used for installing a Media Card Reader

Slots	(1) PCI Express x16 graphics connectors; (3) PCI Express x1 accessory connectors (1) USB 2.0 header for media card reader (1) Parallel port (optional)
Bays	(2) 3.5” internal storage drive bays
Rear I/O	(4) USB 2.0 ports (1) VGA video port; (1) DVI-D video port) (1) RJ-45 network connector (1) RS-232 serial port (1) RS-232 serial (optional) 3.5mm audio in/out jacks

Overview

At A Glance

- Expandable, upgradable chassis and system board
- HP developed and engineered UEFI BIOS supporting security, manageability and software image stability
- Realtek RTL8151GH-CG GbE LOM integrated network connection
- AMD Radeon HD 8240 Integrated Graphics (w/ AMD E1-2500 APU)
- AMD Radeon HD 8330 Integrated Graphics (w/ AMD A4-5000 APU)
- DDR3 Synchronous Dynamic Random Access Memory (SDRAM)
- Multi-independent monitor support via VGA and DVI-D video interfaces
- Discrete graphics options available for all platforms
- DTS Sound + audio management software
- Standard and high efficiency energy saving power supply options
- ENERGY STAR® qualified models certified EPEAT® Gold

PS/2 keyboard and mouse ports

Standard Features and Configurable Components

OPERATING SYSTEMS

Preinstalled When Purchased

Windows 8.1 Pro (64-bit)
Windows 8.1 (64-bit)
Windows 7 Professional (32-bit)**
Windows 7 Professional (64-bit)**
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8 Pro)***
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8 Pro)***
Windows 7 Home Premium (32-bit)**
Windows 7 Home Premium (64-bit)**
Windows 7 Home Basic (32-bit)**

FreeDOS 2.0
Novell SUSE Linux Enterprise Desktop 11

*Not all features are available in all editions of Windows 8.1. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8 functionality. See **http://www.microsoft.com**.

Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See **http://www.microsoft.com/windows/windows-7/ for details.

***This system is preinstalled with Windows 7 Pro software and also comes with a license and media for Windows 8 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

PROCESSORS

AMD Quad-Core A4 APU with AMD Radeon™ HD Graphics

AMD Quad-Core A4-5000 Accelerated Processor with AMD Radeon™ HD 8330 Discrete-Class Graphics (1.5GHz 2MB L2 cache, 15W)

AMD Dual-Core E1 APU with AMD Radeon™ HD Graphics

AMD Dual-Core E1-2500 Accelerated Processor with AMD Radeon™ HD 8240 Discrete-Class Graphics (1.4GHz 1MB L2 cache, 15W)

GRAPHICS

AMD Radeon HD Graphics (integrated on processor)

- Integrated AMD Radeon HD 8240, 8330 or 8400 Graphics depending on processor

AMD Radeon HD 8350 (1GB) FH PCIe x16

AMD Radeon HD 8350 (1GB) PCIe x16

AMD Radeon HD 8490 (1GB) PCIe x16

NVIDIA GeForce GT630 (2GB) FH PCIe x16

NVIDIA NVS 310 x16 1st (no cbl)

NVIDIA NVS 315 (1GB) PCIe x1

ADAPTERS AND CABLES

Standard Features and Configurable Components

HP DMS-59 to Dual DisplayPort Cable

HP DMS-59 to Dual DVI Cable

HP DMS-59 to Dual VGA Cable

HP DisplayPort to DisplayPort Cable

HP DisplayPort to DVI-D Adapter

HP DisplayPort to HDMI Adapter

HP DisplayPort to VGA Adapter

HP Serial Port Adapter

HP Parallel Port Adapter

HP DisplayPort Cable

STORAGE

SATA Drives

500 GB, 7.2K rpm, SATA 6.0 Gb/s, SMART IV, 3.5”

500 GB, 7.2K rpm, SATA 6.0 Gb/s, SMART IV, 3.5”, 2nd Drive (with 3.5” adapter)

1 TB, 7.2K rpm, SATA 6.0 Gb/s, SMART IV, 3.5”

1 TB, 7.2K rpm, SATA 6.0 Gb/s, SMART IV, 3.5”, 2nd Drive (with 3.5” adapter)

Hybrid Drives

500 GB SATA 6G 2.5 (8GB cache) SSHD Drive

500 GB SATA 6G 2.5 2nd Drive (8 GB cache) (with 3.5” adapter)

1 TB SATA 6G 2.5 (8 GB cache) SSHD Drive

1 TB SATA 6G 2.5 2nd Drive (8 GB cache) SSHD Drive (with 3.5” adapter)

Solid State Drives

128 GB SATA 6G 2.5 SSD (with 3.5” adapter)

128 GB SATA 6G 2.5 2nd SSD (with 3.5” adapter)

Self-encrypting Solid State Drive

256 GB SATA 2.5” Self-Encrypting (SED) Solid State Drive (with 3.5” adapter)

256GB SATA 2.5” 2nd Self-Encrypting (SED) Solid State Drive installed w/caddy

Optical Disc Drive

Blu-ray BDXL Writer

Standard Features and Configurable Components

SuperMulti DVD Writer

DVD-ROM

Media Card Reader

15-in-1 Media Card Reader (available March 15, 2014)

MEMORY

Form Factor	Type	Maximum	# of Slots
Microtower	DDR3 non-ECC Up to 1600 MT/s	16 GB	2 UDIMM

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Memory modules support data transfer rates up to 1600 MT/s; actual data rate is determined by the system's configured processor. See processor specifications for supported memory data rate.

NETWORKING/COMMUNICATIONS

Ethernet (RJ-45)

Realtek RTL8151GH-CG GbE LOM (standard)

Intel Ethernet I210-T1 PCIe x1 Gb Network Interface Card (optional)

Wireless

Intel® Dual Band Wireless-N 7260 802.11 a/b/g/n PCI Express (optional)[1]

AUDIO/MULTIMEDIA

HD audio with Realtek ALC221 codec (all ports are stereo)

DTS Studio Sound audio management technology

Microphone* and headphone front ports (3.5mm)

Line-out and Line-In rear Ports* (3.5mm)

Multi-streaming capable*

Internal speaker (standard)

KEYBOARDS AND POINTING DEVICES

Keyboard

HP PS/2 Keyboard

HP USB Keyboard

USB Smart Card (CCID) Keyboard

[1] Intel® Dual Band Wireless-N 7260 planned to be available December, 2013.

Standard Features and Configurable Components

HP USB and PS/2 Washable Keyboard

HP Wireless Keyboard and Mouse Combo

Mice

HP PS/2 Mouse

HP USB Mouse

HP USB 1000dpi Laser Mouse

HP USB and PS/2 Washable Mouse

HP BIOS

Key features of the HP BIOS include:

- Thermal and power management – The HP BIOS provides and enables thermal and power management technologies so component temperatures are managed for high reliability and to assist in operating the HP Business Desktop computer in any enterprise environment.
- Acoustic performance – Industry leading acoustic emissions across the range of operating conditions.
- Serviceability – HP BIOS provides diagnostic and detailed service information.
- Upgrades and recovery – HP BIOS provides numerous ways to upgrade HP Business Desktop computers, including BIOS updates from within DOS, BIOS updates from within Windows, HP Client Manager, and fail-safe recovery if updates are interrupted.
- HP BIOS uses PKI signing of the BIOS for trusted BIOS upgrades and recovery.

Additional BIOS features:

- Administrator password – Also known as the setup password, this helps prevent unauthorized changes to the system configuration. If the administrator password is not known, the BIOS version cannot be changed and changes cannot be made to BIOS settings using F10 setup or under the OS.
- Advanced Configuration and Power Interface (ACPI) – Represents a significant innovation in power and configuration management, allowing operating systems and applications to manage power based on activity and usage.
- S5 Max Power Savings setting supports EU Lot6 requirement and allows the computer to power down below 1W is S5 (when turned off). When S5 Max Power Savings feature is enabled power to slots is turned off along with WOL functionality.

MANAGEABILITY

Fully manageable and supported by industry-standard HP Client Management Solutions. Optional LANDesk management tools simplify mobile device management and security. Simplify everything from deployment or migration to daily management, security, licensing, and more—and stop downtime before it starts.

- Hardware Management: Inventory, Device config and BIOS updates, HW alerting, Driver updates
- Software Management: Deployment, App Management, Patch Management; Deployment and Migration; Proactive HW and SW Management; Mobile Users and Device Management; Remote Assistance / Help Desk
- LANDesk Management Suite 9.5 (LDMS) – optional – contact HP representative for part numbers
- Hardware integration with Microsoft System Center Configuration Manager: Client Integration Kit (CIK), Client

Standard Features and Configurable Components

Catalog, Client Driver Packs

- HP SoftPaq Download Manager (SDM)
- HP System Software Manager (SSM)
- HP BIOS Configuration Utility (BCU)
- HP Driver Packs
- HP Client Management Interface (HP CMI)
-

SECURITY

Trusted Platform Module (TPM) 1.2 (Common Criteria EAL4+ certified)	N/A
SATA port disablement (via BIOS)	X
Drivelock	N/A
RAID configurations	N/A
Serial, parallel, USB enable/disable (via BIOS)	X
Optional USB Port Disable at factory (user configurable via BIOS)	N/A
Removable media write/boot control	X
Power-On password (via BIOS)	N/A
Setup password (via BIOS)	X
HP Chassis (1 bay) Security Kit	X
Solenoid Hood Lock / Sensor	N/A
Support for chassis padlocks and cable lock devices	N/A

ENVIRONMENTAL & REGULATORY

ENERGY STAR® qualified models available

EPEAT® registered where applicable/supported. See epeat.net for registration status by country.

Low halogen (chassis, all internal components and modules)

TAA compliant

PORTS

I/O Ports – Standard

USB 2.0	2 (front); 4 (rear);
USB 3.0	2 (front); 1(internal)
Serial (RS-232)	1
PS/2	1 keyboard (purple) 1 mouse (green)
Video	1 VGA 1 DVI-D
Audio	Front: headphone/mic

Standard Features and Configurable Components

	Rear: line in/out 3.5mm diameter
RJ-45 Network Interface	1
I/O Ports – Optional	
2nd Serial (RS-232)	1
Parallel	1
PCI Express Mini Card	N/A
MXM Graphics	N/A
mSATA	N/A
PCI Express x1 (v2.0)	3 4.2” full height 6.6” length 10W max. power
PCI Express x16 (v2.0) (wired as a x4)	N/A
PCI Express x16 (v3.0)	1 4.2” full height 6.6” length 75W max. power
Optional PCI (v2.3)	N/A

BAYS

3.5" external storage drive	1
5.25" ODD	2
Slim ODD	N/A
2.5” internal storage drive	N/A
3.5” internal storage drive	2

SERVICE AND SUPPORT

On-site Warranty [1]: One-year (1-1-1) limited warranty delivers three years or one year of on-site, next business day [2] service for parts and labor and includes free telephone support [3] 24 x 7. Service offers terms up to 5 years by choosing a Care Pack. To choose the right level of service for your HP product, visit HP Care Pack Central: hp.com/go/cpc

NOTE 1: Terms and conditions may vary by country. Certain restrictions and exclusions apply. Other warranty variations may be offered in your region.

NOTE 2: On-site service may be provided pursuant to a service contract between HP and an authorized HP third-party provider, and is not available in certain countries. Global service response times are based on commercially reasonable best effort and may vary by country.

NOTE 3: Technical telephone support applies only to HP-configured and third-party HP qualified hardware and software. Toll-free calling and 24 x 7 support may not be available in some countries.

Standard Features and Configurable Components

Technical Specifications – Operating Systems and Software

OPERATING SYSTEMS

Preinstalled

Windows 8.1 Pro (64-bit)*
Windows 8.1 (64-bit)*
Windows 7 Professional (32-bit)**
Windows 7 Professional (64-bit)**
Windows 7 Professional (32-bit) (available through downgrade rights from Windows 8 Pro)***
Windows 7 Professional (64-bit) (available through downgrade rights from Windows 8 Pro)***
Windows 7 Home Premium (32-bit)**
Windows 7 Home Premium (64-bit)**
Windows 7 Home Basic (32-bit)**
FreeDOS 2.0
Novell SUSE Linux Enterprise Desktop 11

For all Preinstalled operating systems HP provides Microsoft WHQL certified (where applicable) drivers on hp.com at the time of product announcement.

Web Support

Windows 7 Enterprise (32-bit or 64-bit)

For all Supported operating systems HP performs testing of the OS, and makes available all HP value add software (OS dependent). Certified drivers are made available on hp.com within 30 days of product announcement.

Certified

Novell SUSE Linux Enterprise Desktop 11[1]
Red Hat Enterprise Linux 64[1]

For all Certified operating systems HP will submit hardware to the operating system vendor for testing and certification. All drivers would be obtained from the operating system vendor, not supplied by HP. Certification will be posted by the operating system vendor.

*Not all features are available in all editions of Windows 8.1. Systems may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 8.1 functionality. See microsoft.com.

**Not all features are available in all editions of Windows 7. This system may require upgraded and/or separately purchased hardware to take full advantage of Windows 7 functionality. See microsoft.com/windows/windows-7/ for details.

***This system is preinstalled with Windows® 7 Pro software and also comes with a license and media for Windows 8.1 Pro software. You may only use one version of the Windows software at a time. Switching between versions will require you to uninstall one version and install the other version. You must back up all data (files, photos, etc.) before uninstalling and installing operating systems to avoid loss of your data.

[1]The following features are not supported by Novell SUSE Linux Enterprise Desktop:

- Intel Gigabit CT Desktop NIC
- Broadcom NetXtreme Gigabit Ethernet Plus
- HP Client Security
- HP Blu-ray Writer playback of commercial movies
- HP 2nd serial port adapter
- Power Management features

Systems configured with Linux do not qualify for ENERGY STAR®

Technical Specifications – Operating Systems and Software

The following features are not supported by Red Hat Enterprise Linux 64:

- TPM v1.2 embedded Security Chip
- Intel Gigabit CT Desktop NIC
- HP Wireless 802.11b/g/n NIC
- HP Blu-ray Writer
- HP 2nd serial port Adapter
- HP USB Smart Card (CCID) Keyboard
- Power Management features

Systems configured with Linux do not qualify for ENERGY STAR®

SOFTWARE COMPONENTS AND APPLICATIONS WITH WINDOWS

Included	Windows 7	Windows 8.1
Security	HP Client Security: HP Drive Encryption (FIPS 140-2) HP Device Access Manager with Just In Time Authentication HP Password Manager HP File Sanitizer (SSDs and Hybrid Drives not supported) HP Disk Sanitizer External Edition[1] Microsoft Security Essentials	Disk Sanitizer External Edition[1] Microsoft Defender
MultiMedia	Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)	Cyberlink Power DVD, BD Cyberlink Power2Go (Secure Burn)
Communication		HP Wireless Hotspot
HP Value Add	HP ePrint Driver[2] HP PageLift HP Support Assistant HP Recovery Disk Creator	HP ePrint Driver[2] HP PageLift HP Recovery Manager HP Support Assistant
3rd Party	Adobe Flash Player Box PDF Complete, Corporate Edition Skype	PDF Complete, Corporate Edition Skype
Microsoft Products	Buy Office	Buy Office

[1] Available via download.

[2] Requires an Internet connection to HP web-enabled printer and HP ePrint account registration (for a list of eligible printers, supported documents and image types and other HP ePrint details, see hp.com/go/eprintcenter). Requires optional broadband module. Broadband use requires separately purchased service contract. Check with service provider for coverage and availability in your area. Separately purchased data plans or usage fees may apply. Print times and connection speeds may vary.

Technical Specifications - Graphics

Integrated AMD Radeon HD 8240, 8330 & 8400 Graphics

Memory	Variable and user selectable in BIOS settings
Controller Clock Speed	Variable depending on the installed APU model
Maximum Color Depth	32 bpp (8-8-8-8)
Multidisplay Support	Yes (2)
Graphics /API support	DX 11.1, Shader Model 5, UVD 4.2, VCE 2.0, OpenGL 4.2 (4.1+), OpenCL 1.2, and DirectCompute 11
Output Connectors	1 VGA and 1 DVI-D (with HDCP support)

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Supported Resolution	VGA Connection	DVI-D Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	N/A
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	N/A
2560 x 1600	N/A	N/A

Note: 60-R denotes reduced blanking timings are used on single link DVI connections

NVIDIA NVS 310 Graphics Card

Introduction	The NVIDIA® NVS™ 310 Graphics Card is a PCI Express low profile form factor graphics add-in card targeted as an active low cost graphics solution for the corporate business and enterprise markets. The NVIDIA® NVS 310 graphics card is an ideal solution for customers requiring a small form factor graphics add-in card for either standard or small form factor PC designs.

Technical Specifications - Graphics

Performance and Features	The NVIDIA® NVS 310 Graphics Card offers 512 MB of ultrafast DDR3 memory and is capable of supporting up to 2 displays. DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA. For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.	
Form Factor	Low Profile: 2.713 × 6.15 in	
Graphics Controller	NVIDIA® NVS 310	
Memory Clock	875MHz	
Memory Size	512 MB DDR3	
Memory Bandwidth	14 GB/s	
Max. Power	19.5W	
Display Max. Resolution	Up to 2560 x 1600 (digital display) per display	
Display Output	Up to 2 displays in the following configurations	
	DisplayPort output:	• Drives two DisplayPort enabled digital display at resolutions up to 2560 × 1600 at 60 Hz with reduced blanking, when connected natively using the 2 DisplayPort connectors on the NVS 310 graphics card • Supports 2 monitors up to resolution of 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort Multi-Stream topology technology.
	DVI-D output:	• Drives two digital display at resolutions up to 1920 × 1200 at 60 Hz with reduced blanking using DisplayPort to DVI-D single-link cable adaptors • Drives two digital display at resolutions up to 2560× 1600 at 60 Hz with reduced blanking using DisplayPort to DVI-D dual-link cable adaptors
	HDMI output:	• NVS 310 is capable of driving two high definition (HD) panels up to resolutions of 1920 × 1080P at 60 Hz using DisplayPort to HDMI cable adaptors
	VGA display output:	• Drives two analog display at resolutions up to 1920 × 1200 at 60 Hz using DisplayPort to VGA cable adaptors

Technical Specifications - Graphics

Supported Display Resolutions and Refresh Rates **Note**: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP				
Resolution	**Maximum Refresh Rates (Hz) by Connection**			
	DisplayPort to VGA	DisplayPort to DVI-D	DisplayPort to HDMI	DisplayPort
640 x 480	85	60	60	60
800 x 600	85	60	60	60
1024 x 768	85	60	60	60
1280 x 720	85	60	60	60
1280 x 1024	85	60	60	60
1440 x 900	75	60	60	60
1600 x 1200	60	60	60	60
1680 x 1050	60	60	60	60
1920 x 1080	60-R	60-R	60	60
1920 x 1200	60-R	60-R		60
1920 x 1440				60
2048 x 1536				60
2560 x 1600				60

NVIDIA GeForce GT630 Graphics Card	
Introduction	The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Card Graphics Card provides a full height, PCI Express x16 graphics add-in card solution based on the NVIDIA Kepler Architecture GPU. The card is designed to support three display connections through its DVII, and two DisplayPort connectors. An ideal solution for desktop PC customers seeking enhanced 2D and advanced 3D graphics performance, the NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards are an excellent choice for business users who want run multiple displays from a single graphics board. Engage in Web conferencing or video or photo editing, while improving your everyday business PC experience with better graphics and excellent visual display quality.
Performance and Features	The NVIDIA GeForce GT630 DP (2GB) PCIe x16 Cards deliver superior PCI Express (PCIe) Gen 3 features including: • Unprecedented flexibility for new applications and enhanced performance • Support for NVIDIA surround technology • Run multiple displays from a single graphics card • Full 16 lane PCIe Generation 3 bus support with peak bandwidth support • Wireless Display ready for future support
Form Factor	PCIe x16 Card

Technical Specifications - Graphics

Graphics Controller	NVIDIA Kepler Architecture GPU
Core Clock	875 MHz
Memory Clock	891 MHz
Memory Size	2 GB DDR3 128 bit
Memory Bandwidth	28.5 GB/s
Display Max. Resolution	2560 x 1600 digital, 2048 x 1536 analog
Display Support	Integrated 400 MHz RAMDAC

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rates (Hz)**	
	Analog Connection	Digital Connection
640 x 480	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	60
2048 x 1536	75	60
2560 x 1600	N/A	60

NVIDIA NVS 315 1GB PCIe x 16 Graphics Card	
Introduction	Get efficient dual-display graphics performance in a PCI Express low-profile graphics card with the NVIDIA NVS 315 PCIe x16 1 GB Graphics Card, an ideal desktop graphics solution for professional business and commercial applications.

Technical Specifications - Graphics

Performance and Features	The NVIDIA® NVS 315 Graphics Card offers 1 GB of ultrafast DDR3 memory and is capable of supporting up to 2 displays. DisplayPort connector supports multimode technology to support connection to DVI-D, VGA and HDMI monitors with optional adapters in kits NR078AA, FH973AT, BP937AA, AS615AA. For a DisplayPort to DisplayPort connections use the optional DisplayPort Cable Kit VN567AA.
Form Factor	Low Profile: 2.713 × 6.15 in
Graphics Controller	NVIDIA® NVS 315
Memory Clock	875MHz
Memory Size	512 MB DDR3
Memory Bandwidth	14 GB/s
Connectors	DMS-59 , with support for dual VGA, dual DVI or dual Display Port with the appropriate adapter cable
Display Max. Resolution	Up to 2048 x 1536 VGA; 1920 x 1200 DVI; 2560 x 1600 DisplayPort
Display Output	Up to 2 displays in the following configurations

	• Dual DVI :
	  ○ Drives two DVI displays using optional HP DMS59 DVI Dual-head Connector Cable DL139A
	• Dual DisplayPort :
	  ○ Drives two DisplayPort using optional HP DMS-59 to Dual DisplayPort kit XP688AA
	• Dual VGA :
	  ○ Drives two analog using the included HP DMS-59 to Dual VGA Cable

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

Resolution	**Maximum Refresh Rates (Hz) by Connection**	
	Analog Connection	Digital Connection
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60

Technical Specifications - Graphics

1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	60
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60*
2560 x 1600	N/A	60*
		* Display Port Only

AMD Radeon HD 8350 1GB PCIe x16 DH Graphics Card	
Introduction	Get stable 2D and advanced 3D graphics performance from the AMD Radeon HD 8350 1 GB PCIe x16 DH Graphics Card, a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8350 GPU, great for Web conferencing or video and photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8350
Core Clock	GPU engine operates at 523 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	875 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 1920 x 1200 Analog 2048 x 1536

Supported Display Resolutions and Refresh Rates

Note: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP

	Analog Connection	Digital Connection
640 x 480	85	60

Technical Specifications - Graphics

720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	N/A
2560 x 1600	N/A	N/A

AMD Radeon HD 8490 1GB PCIe x16 Graphics Card	
Introduction	Get impressive graphics and high resolution dual-display performance in a low profile, PCI Express x16 graphics add-in card based on the AMD Radeon HD 8490 Graphics Processor. Improve your everyday PC, Web conferencing, and video or photo editing.
Form Factor	PCie x16
Graphics Controller	AMD Radeon HD 8490
Core Clock	GPU engine operates at 875 MHz
Memory	1GB, DDR3, SDRAM
Memory Clock	900 MHz
HDCP Support	Yes
Display Max. Resolution	Digital 2560 x 1600 Analog 2048 x 1536
Supported Display Resolutions and Refresh Rates **Note**: other resolutions may be available but are not recommended as they may not have been tested and qualified by HP	

Technical Specifications - Graphics

	Analog Connection	Digital Connection
300 x 200	85	60
320 x 240	85	60
400 x 300	85	60
640 x 480	85	60
720 x 480	85	60
720 x 576	85	60
800 x 600	85	60
1024 x 768	85	60
1280 x 720	85	60
1280 x 768	85	60
1280 x 1024	85	60
1440 x 900	75	75
1600 x 900	85	60
1600 x 1024	85	60
1600 x 1200	85	60
1680 x 1050	75	75-R
1920 x 1080	85	60-R
1920 x 1200	85	60-R
1920 x 1440	85	N/A
2048 x 1536	75	N/A
2560 x 1440	N/A	60
2560 x 1600	N/A	60

Technical Specifications – Hard Disk and Solid State Storage

Introduction:

HP Serial Advanced Technology Attachment (SATA) Hard Drives maximize the performance of HP Business PCs by providing the technologies to meet your increasing storage demands with high-capacity drives offering superior reliability and performance.

SATA provides faster data transfer speeds, better system cooling airflow, more bandwidth, more headroom for speed increases in future generations and better data integrity. A next-generation technology, the SATA interface connects hard drives to the PC platform enabling easy aggregation of multiple hard drives into a single PC. This offers you the additional benefits of dedicated bandwidth, the ability to more easily identify device failures and scalability. The HP ProDesk 405 G1 Series Business PC supports the latest SATA 6.0Gb/s specification.

SMART IV Technology

Self Monitoring Analysis and Reporting Technology (SMART) hard drive technology allows hard drives to monitor their own health and to raise flags if imminent failures are predicted. If the drive determines that a failure is imminent, the SMART hard drive technology enables the intelligent manageability or management software to generate a fault alert. While the current versions of SMART hard drives do a good job monitoring the data on the hard drive media, the ever increasing emphasis on reliability and quality has promoted HP to implement SMART IV technology which constantly checks that the data flow from host interface to media and media to host interface is not compromised. This is accomplished by inserting a 2 byte parity code into every 512 byte block in the data path of the hard drive's Cache RAM. This unique parity checking performed by HP's SMART IV technology hard drives, allows for more complete error detection coverage encompassing the entire data path between the host and the hard drive.

Smart IV is also known as IOEDC: I/O Error Detection Code.

Native Command Queuing

NCQ or Native Command Queuing is a SATA protocol extension that allows the hard drive to have several write or read commands outstanding at the same time. In contrast, normal non-queued operation requires each command to be completed before the next command is issued by the host system. Queuing allows the drive to complete the commands in the order that allows for best overall throughput. It also involves an advanced method of transferring data to or from the host, called First Party Direct Memory Access (FPDMA), which allows the hard drive and the host controller to manage the data transfers for multiple outstanding commands, without involving the host processor. NCQ can contribute to better performance but the results are dependent on many factors, including the access patterns of the various applications and operating system functions that are initiating drive accesses. Enabling NCQ features in the hard drive requires AHCI support from the host system BIOS, controller, and driver. AHCI support is typically implemented in RAID configurations.

Note: GB = 1 billion bytes. Actual available capacity is less.

HP 1-TB SATA 6G 2.5” 8GB Solid State Hybrid Drive (SSHD)	
Formatted Capacity	1 TB
Spindle Speed	5,400 rpm +/- 0.2%

Technical Specifications – Hard Disk and Solid State Storage

Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash	
Interface	Serial ATA (SATA)	
Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms
Height	0.374 +/-.008 in (9.5 +/- 0.2 mm)	
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)	
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)	
Weight	0.254 lb/115 g (max)	
Operating Temperature	32° to 140° F (0° to 60° C)	

HP 500 GB SATA 6G 2.5" 8GB Solid State Hybrid Drive (SSHD)		
Formatted Capacity	500 GB	
Spindle Speed	5,400 rpm +/- 0.2%	
Drive Type	Solid State Hybrid Drive (SSHD) technology with NAND Flash	
Interface	Serial ATA (SATA)	
Cache Buffer	64 MB	
NAND Flash Commercial Multilevel Cell (cMLC)	8 GB	
Number of Sectors	976,773,168	
Seek Time (typical reads)	Single Track:	2.0 ms
	Average:	12 ms

Technical Specifications – Hard Disk and Solid State Storage

Height	0.268 +/-.008 in (6.8 +/- 0.2 mm)
Width	2.750 +/- 0.010 in (69.85 +/- 0.25 mm)
Length	3.951 +0.008 / -0.010 in (100.35 +0.20 / -0.25 mm)
Weight	0.209 lb/95 g (max)
Operating Temperature	32° to 140° F (0° to 60° C)

HP 128 GB Solid State Drive		
Unformatted Capacity	128 GB*	
Architecture	Multi Level Cell (MLC) NAND	
Interface	SATA 6 GB/sec	
Dimensions (W x H x D)	2.75 x 0.276 x 3.96 in (6.985 x 0.7 x 10.05 cm)	
Weight	0.16 lb (73 g)	
Bandwidth Performance	Sustained Sequential Read:	Up to 450 MB/ss
	Sustained Sequential Write:	Up to 260 MB/s
	Random Read (4KB):	up to 46K IOPs
	Random Write (4KB):	up to 56K IOPs
Latency	Read:	55ms (TYP)
	Write:	55ms (TYP)
Power	DC power requirement:	Min 4.5 V; Max 5.5 V
	Total power consumption:	160 mW (Active) ; <85 mW; (Idle)
Useful Drive Life	1.2 million device hours**	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity (operating):	5% to 95%
	Shock:	1,500 G/1.0 msec
Regulations	UL, CSA, EN 60950-2000, CISPR Pub 22 Class B, CNS 13438, AS/NZS	

	CISPR 22:2002 Class B, Korea KCC, CE Mark

* For solid state disk drives, GB means 1 billion bytes. 128GB is the unformatted capacity of this drive before a portion of the drive is reserved for flash management features. Actual capacity will vary by content
** The product achieves a mean time between failure (MTBF) based on population statistics not relevant to individual units.

HP 256 GB SATA 2.5" Self-Encrypting (SED) Solid State Drive		
Unformatted Capacity	256,186,209,271 bytes	
Architecture	Self-Encrypting (SED) Solid State Drive with 25nm MLC NAND Flash and SATA interface	
Interface	Serial ATA 2.0 (3.0 Gb/s)	
NAND Flash	25nm MLC NAND Flash	
Height	.275 in/7mm	
Width	2.75 in/69.85 mm	
Length	3.95 in/100.5 mm	
Weight	0.161 lb (73 g)	
Bandwidth Performance	Sustained Sequential 128k Read:	Up to 450 MB/s
	Sustained Sequential 128k Write:	Up to 260 MB/s
	Random 4k Read:	Up to 46K IOPs
	Random 4k Write:	Up to 56K IOPs
Latency	Read:	55 µs
	Write:	55 µs
Power	SATA power consumption:	160 mW (active average); <85 mW (idle average)
Useful Drive Life	72TB written, up to 40GB/day for 5 years	
Environmental (all conditions, non-condensing)	Operating Temperature:	32° to 158° F (0° to 70° C)
	Relative Humidity:	5% to 95%

	Shock:	1,500 G/1 ms

HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive		
Capacity	1,000,204,886,016 bytes	
Rotational Speed	7,200 rpm	
Interface	Serial ATA 3.0 (6.0 Gb/s)	
Buffer Size	32 MB	
Logical Blocks	1,953,525,168	
Seek Time (typical reads, includes controller overhead, including settling)	Single Track:	2.0 ms
	Average:	11 ms
	Full-Stroke:	21 ms
Height (nominal)	1 in/2.54 cm	
Width (nominal)	Media diameter: 3.5 in/8.89 cm	
	Physical size: 4 in/10.2 cm	
Operating Temperature	41° to 131° F (5° to 55° C)	

Technical Specifications - Removable Storage

HP Blu-ray BDXL Writer Drive			
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA		
Disc capacity	Blu-ray: 128 GB QL, 100 GB TL, 50 GB DL or 25 GB standard DVD: 8.5GB DL or 4.7GB standard		
Dimensions (W x H x D)	5.8 x 1.7 x 7.1 in (14.8 x 4.2 x 18.0 cm) max		
Weight (max)	2.1 lb (950g)		
Performance	**CD-ROM Read Access time**	Random	140 ms (typical)
		Full Stroke	230 ms (typical)
	DVD-ROM Read Access time	Random	150 ms (typical)
		Full Stroke	240 ms (typical)
	BD-ROM Read Access time	Random	250 ms (typical)
		Full Stroke	350 ms (typical)
	Startup Time	(Time to drive ready from tray loading)	
		BD-ROM (SL/DL)	28S / 28S
		BD-R (SL/DL/TL/QL)	28S / 28S / 40S / 40S
		BD-RE (SL/DL/TL)	28S / 28S / 40S
		DVD-ROM (SL/DL)	18S / 18S
		DVD-R (SL/DL)	25S / 25S
		DVD-RW	25S
		DVD+R (SL/DL)	25S / 25S
		DVD+RW	25S
		DVD-RAM	35S
		CD-ROM	15S
	CD Read speeds	CD-ROM up to 40X	
		CD-R up to 40X	
		CD-RW up to 40X	
	DVD Read speeds	DVD-RAM up to 5X	
		DVD+/-RW up to 10X	

Technical Specifications - Removable Storage

		DVD+/-R up to 16X
		DVD+/-R DL up to 8X
		DVD-ROM up to 16X
		DVD-ROM DL up to 8X
	Blu-ray Read speeds	BD-ROM (SL/DL) up to 8X
		BD-R (SL/DL) up to 8X
		BD-R (TL/QL) up to 6X
		BD-RE (SL/DL) up to 6X
		BD-RE TL up to 4X
	CD Write speeds	CD-R up to 40X
		CD-RW up to 24X
	DVD Write speeds	DVD+/-R up to 16X
		DVD+/-R DL up to 8X
		DVD+RW up to 8X
		DVD-RW up to 6X
		DVD-RAM up to 5X
	Blu-ray Write speeds	BD-R (SL/DL) up to 6X
		BD-R (TL/QL) up to 4X
		BD-RE (SL/DL/TL) up to 2X
Power	**Source**	SATA DC power receptacle
	DC Power Requirement	5 VDC ± 5%-100 mV ripple p-p 12 VDC ± 5%-200 mV ripple p-p
	DC Current	5 VDC -1200 mA typical, 1500 mA maximum 12 VDC -1000 mA typical, 1500 mA maximum
Environmental (all conditions non-condensing)	**Temperature** (operating)	41° to 122° F (5° to 50° C)
	Relative Humidity	10% to 90%
	Maximum Wet Bulb Temperature	86° F (30° C)

HP SuperMulti DVD Writer Drive	
Height	5.25-inch, half-height, tray-load
Orientation	Either horizontal or vertical
Interface type	SATA

Technical Specifications - Removable Storage

Dimensions (W x H x D)	5.8 x 1.7 x 6.9 in (14.8 x 4.2 x 17.5 cm) max		
Weight (max)	2.1 lb (950g)		
Performance	CD-ROM Read Access	Random	120 ms typical
		Full Stroke	200 ms typical
	DVD-ROM Read Access	Random	130 ms typical
		Full Stroke	240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)
	DVD Media Read Transfer	DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)
		DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD+/-R	Up to 21600 KB/s (16X)
		DVD+/-R DL	Up to 10800 KB/s (8X)
		DVD+/-RW	Up to 10800 KB/s (8X)
		DVD-RAM	Up to 6750 KB/s (5X)
	CD Media Write Transfer	CD-R	Up to 6000 KB/s (40X)
		CD-RW	Up to 600 KB/s (4X)
		CD-RW (High speed)	Up to 1500 KB/s (10X)
		CD-RW (Ultra speed)	Up to 3600 KB/s (24X)
	DVD Media Write Transfer	DVD+/-R	Up to 21600 KB/s (16X)
		DVD+/-R DL	Up to 10800 KB/s (8X)
		DVD+RW	Up to 10800 KB/s (8X)
		DVD-RW	Up to 8100 KB/s (6X)
		DVD-RAM	Up to 6750 KB/s (5X)
Media Compatibility	**Media**	**Read**	**Write**
	CD-ROM	Yes	No
	CD-R	Yes	Yes
	CD-RW	Yes	Yes
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No

Technical Specifications - Removable Storage

	DVD-RAM	Yes	Yes
	DVD+/-R	Yes	Yes
	DVD+/-R DL	Yes	Yes
	DVD+/-RW	Yes	Yes
Power Supply	Source	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
	DC Current	5 VDC	1000 mA (typical) 1600 mA (max.)
		12 VDC	1200 mA (typical) 2000 mA (max.)
		Total Drive Power (Standby Mode)	< 2.5W
Rear Panel	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
Environmental conditions (all conditions non-condensing)	Operating Temperature	41° to 122° F (5° to 50° C)	
	Storage Temperature	–22° F to 140° F (–30° C to 60° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	

HP DVD-ROM Drive			
Height	5.25-inch, half-height, tray-load		
Orientation	Either horizontal or vertical		
Interface type	SATA		
Dimensions (W x H x D)	5.8 x 1.7 x 6.9 in (14.8 x 4.2 x 17.5 cm) max		
Weight (max)	2.1 lb (950 kg)		
Performance	CD-ROM Read Access	Random	120 ms typical
		Full Stroke	200 ms typical
	DVD-ROM Read Access	Random	130 ms typical
		Full Stroke	240 ms typical
	CD Media Read Transfer	CD-ROM, CD-R Read	Up to 6000 KB/s (40X)
		CD-RW Read	Up to 4800 KB/s (32X)
		Digital/Analog Audio Playback	Up to 2400 KB/s (16X)
		Digital Audio Extraction (CD-ROM, CD-R)	Up to 6000 KB/s (40X)
		Digital Audio Extraction (CD-RW)	Up to 4800 KB/s (32X)
		Video CD Playback	Up to 2400 KB/s (16X)

Technical Specifications - Removable Storage

	DVD Media Read Transfer	DVD-ROM SL Read	Up to 21600 KB/s (16X)
		DVD-ROM DL Read	Up to 10800 KB/s (8X)
		DVD Video Playback	Up to 10800 KB/s (8X)
		DVD Video SL (other than playback)	Up to 21600 KB/s (16X)
		DVD Video DL (other than playback)	Up to 10800 KB/s (8X)
		DVD+/-R	Up to 21600 KB/s (16X)
		DVD+/-R DL	Up to 10800 KB/s (8X)
		DVD+/-RW	Up to 10800 KB/s (8X)
		DVD-RAM	Up to 6750 KB/s (5X)
Media Compatibility	**Media**	**Read**	**Write**
	CD-ROM	Yes	No
	CD-R	Yes	No
	CD-RW	Yes	No
	DVD-ROM	Yes	No
	DVD-ROM DL	Yes	No
	DVD-RAM	Yes	No
	DVD+/-R	Yes	No
	DVD+/-R DL	Yes	No
	DVD+/-RW	Yes	No
Power Supply	Source	SATA DC power receptacle	
	DC Power Requirement	5 VDC ± 5%	100 mV ripple p-p
		12 VDC ± 5%	200 mV ripple p-p
	DC Current	5 VDC	1000 mA (typical) 1600 mA (max.)
		12 VDC	1200 mA (typical) 2000 mA (max.)
		Total Drive Power (Standby Mode)	< 2.5W
Rear Panel	SATA Power Connector, 15-pin SATA Data Connector, 7-pin Markings to identify each connector		
Environmental conditions (all conditions non-condensing)	Operating Temperature	41° to 122° F (5° to 50° C)	
	Storage Temperature	–22° F to 140° F (–30° C to 60° C)	
	Relative Humidity	10% to 90%	
	Maximum Wet Bulb Temperature	86° F (30° C)	

Technical Specifications - Removable Storage

Platform Memory Support

- The Microtower platform supports up to four (2) industry-standard DDR3-SDRAM DIMMs.

CAUTION: You must shut down the computer and disconnect the power cord before adding or removing memory modules. Regardless of the power-on state, voltage is always supplied to the memory modules as long as the computer is plugged in to an active AC outlet. Adding or removing memory modules while voltage is present may cause irreparable damage to the memory modules or system board.

NOTE: For systems configured with more than 3 GB of memory and a 32-bit operating system, all memory may not be available due to system resource requirements. Addressing memory above 4 GB requires a 64-bit operating system.

Realtek RTL8151GH-CG GbE LOM Network Adapter		
Connector	RJ-45	
System Interface	Integrated on PCA	
Controller	Realtek RTL8151GH-CG Gigabit Ethernet Controller	
Memory	16 KB FIFO packet buffer memory	
Data rates supported	10/100/1000 Mbps	
IEEE Compliance	802.1P 802.1Q 802.3 802.3ab 802.3az 802.3u	
Bus architecture	PCI Express	
Data transfer mode	PCIe-based interface for active state operation (S0 state)	
Power requirement	Requires 3.3V and 1V or just 3.3V with integrated regulators Power consumption 0.425 W	
Network transfer mode	Full-duplex	
	Half-duplex (not supported for the 1000BASE-T transceiver)	
Network transfer rate	10BASE-T (half-duplex) 10 Mbps	
	10BASE-T (full-duplex) 20 Mbps	
	100BASE-TX (half-duplex) 100 Mbps	
	100BASE-TX (full-duplex) 200 Mbps	
	1000BASE-T (full-duplex) 2000 Mbps	
Environmental	Operating Temperature:	32° to 158° F (0° to 70° C)
	Operating Humidity:	60% RH
Management	WOL, auto MDI crossover, PXE, Multi-port teaming, Advanced cable diagnostic	
Intel® Ethernet I210-T1 Gigabit Network Adapter		
Connector	RJ-45	

Technical Specifications – Networking/Communication

System Interface	PCI Express x1	
Controller	Intel® I210 Gigabit Ethernet Controller	
Memory	Integrated Dual 48K configurable transmit receive FIFO Buffers	
Data rates supported	10/100/1000 Mbps	
IEEE Compliance	802.1P 802.1Q 802.2 802.3 802.3AB 802.3u 802.3x flow control	
Bus architecture	PCI-E 2.1	
Data path width	X1, 250 MB/s, Bi-directional interface	
Data transfer mode	Bus-master DMA	
Hardware certifications	FCC, B, CE, TUV-c, TUVus Mark Canada and United States, TUV-GS Mark for European Union	
Power requirement	Aux 3.3 V, 3.0 Watts in 1000 base-T and 1.0 Watts in 100 Base-T	
Boot ROM support	Yes 10BASE-T (half-duplex) 10 Mbps 10BASE-T (full-duplex) 20 Mbps	
Network transfer rate	10BASE-T (half-duplex) 10 Mbps	
	10BASE-T (full-duplex) 20 Mbps	
	100BASE-TX (half-duplex) 100 Mbps	
	100BASE-TX (full-duplex) 200 Mbps	
	1000BASE-T (full-duplex) 2000 Mbps (actual rate limited by PCI bus)	
Environmental	Operating Temperature:	32° to 132° F (0° to 55° C)
	Operating Humidity:	85% at 131° F (55° C)
Management	WOL, PXE, DMI, WFM 2.0	

Intel Dual Band Wireless-N 7260 802.11 a/b/g/n (2x2) Wireless Network Interface

Technical Specifications – Networking/Communication

Connection		
Wireless LAN Standards	IEEE 802.11a/b/g/n	
Interoperability	Wi-Fi certified (802.11 a/b/g/n WMM, WPA, WPA2 and WPS)	
	Cisco Compatible Extensions Program compliant with Microsoft Windows 7, Windows Vista and XP.	
	NOTE: WLAN supplier's client utility is required for Cisco Compatible Extensions support with Microsoft Windows XP. WLAN may also be compatible with certain third-party software supplicants. WLAN supplier IHV extensions required for Cisco Compatible Extensions support for Microsoft Windows Vista.	
Frequency Band	802.11b/g/n	2.402-2.482 GHz
	802.11a/n	4.9 - 4.95 GHz (Japan) 5.15 - 5.25 GHz 5.25 - 5.35 GHz 5.47 - 5.725 GHz 5.825 - 5.850 GHz
Antenna Structure	2 transmit; 2 receive (2x2)	
Data Rates	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11b: 1, 2, 5.5, 11 Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: MCS 0 ~ MCS 15, (20MHz, and 40MHz)	
Modulation	Direct Sequence Spread Spectrum CCK, BPSK, QPSK, 16-QAM, 64-QAM	
Security	• IEEE and WiFi compliant 64 / 128 bit WEP encryption for a/b/g mode only • AES-CCMP: 128 bit in hardware • 802.1x authentication • WPA, WPA2: 802.1x. WPA-PSK, WPA2-PSK, TKIP, and AES. • WPA2 certification • IEEE 802.11i • Cisco Certified Extensions, all versions through CCX4 and CCX Lite • WAPI	
	Note: Check latest software/driver release for updates on supported security features.	
Sub-channels	Multinational support with frequency bands and channels compliant to local regulations.	
Network Architecture Models	Ad-hoc (Peer to Peer) Infrastructure (Access Point Required)	
Roaming	IEEE 802.11 compliant roaming between band Access Points	
Output Power	• 2.4G: +13.5dBm minimum	

Technical Specifications – Networking/Communication

	• 5G: +12dBm minimum	
	Note: Maximum output power may vary by country according to local regulations.	
Power Consumption	Transmit: 2.0 Watts	
	Receive: 1.6 Watts	
	Idle mode: 250 mW (WLAN associated) In Power Save Polling mode and on battery power.	
	Idle mode: 100 mW (WLAN unassociated)	
	Radio off: 100 mW (WLAN unassociated)	
Power Management	ACPI compliant power management 802.11 compliant power saving mode	
Receiver Sensitivity Note: Receiver sensitivity is measured at a packet error rate of 8% for 802.11b (CCK modulation) and a packet error rate of 10% for 802.11a/g (OFDM modulation).	802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps) 802.11b:-95 dBm (1 Mbps), -93 dBm (2 Mbps), -91 dBm (5.5 Mbps), -88 dBm (11 Mbps) 802.11g:-90 dBm (6 Mbps), -89 dBm (9 Mbps), -87 dBm (12 Mbps), -85 dBm (18 Mbps), -82 dBm (24 Mbps), -79 dBm (36 Mbps), -76 dBm (48 Mbps), -74 dBm (54 Mbps)	
Antenna Connections	2 U.FL type connectors (output impedance of 50 ± 2 ohms)	
Form Factors	PCI-Express Half-MiniCard	
Weight	0.0068 lb (3.1 g)	
Dimensions	0.12 x 1.06 x 1.18 in (3.1 x 26.8 x 30.0 mm)	
Operating Voltage	3.3V +/- 9%	
Temperature	**Operating:** **Non-operating:**	14° to 158° F (-10° to 70° C) -40° to 176° F (-40° to 80° C)
Humidity	**Operating:** **Non-operating:**	10% to 90% (non-condensing) 5% to 90% (non-condensing)
Altitude	**Operating:** **Non-operating:**	0 to 10,000 ft (3,048 m) 0 to 50,000 ft (15,240 m)
LED Activity	LED Amber - Radio OFF; LED White - Radio ON	

High Definition Audio

Type	Integrated
HD Stereo Codec	Realtek 2-channel ALC221 codec

Technical Specifications – Audio

Audio I/O Ports	Front microphone-In (150-K ohm Input Impedance)
	Rear Line-In/Microphone input (150-K ohm Input Impedance, function is configurable by audio driver)
	Rear Line-Out* (190 ohms Output Impedance, expects at least a 10-K ohm load)
	Front Headphone-Out (0.5 Ohm Output Impedance, expects at least a 32 ohm load) Front Microphone/Headphone jack is re-task able to provide Microphone input, line-in or Headphone output to support connecting two headphones to the front of the system. When configured as a second front headphone output, both front headphone outputs are always driven with the same signal.
	All ports are 3.5mm
Internal Speaker Amplifier	1.5W amplifier for the internal speaker only. External speakers must be powered externally. Rear Line-in audio port is re-taskable as either Line-in or Microphone-In.
Multi-streaming Capable	Multi-streaming can be enabled in the Realtek control panel to allow independent audio streams to be sent to/from the front and rear jacks.
Sampling	8 kHz - 192 kHz
Wavetable Syntheses	Yes – Uses OS soft wavetable
Analog Audio	Yes
# of Channels on Line-Out	Stereo (Left & Right channels)
Internal Speaker	Yes
External Speaker Jack	Yes

Technical Specifications - Input/Output Devices

HP USB Keyboard		
Physical characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.12 x 6.47 x 0.96 in (46.03 x 16.43 x 2.44 cm)
	Weight	2 lb (0.9 kg)
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft® PC 99 - 2001	Functionally compliant
Mechanical	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)
	Operating shock	40 g, six surfaces

Technical Specifications - Input/Output Devices

	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	30 in (76.2 cm) on concrete, 16-drop sequence
Approvals	UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, KC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	
Kit contents	Keyboard	Installation Guide
	Warranty Card	Safety and Comfort Guide

HP PS/2 Keyboard		
Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country)
	Dimensions (L x W x H)	18.22 x 6.47 x 1.1 in (46.28 x 16.43 x 2.79 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 10%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	PS/2 6-pin mini din connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
	Keycaps	Low-profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys

Technical Specifications - Input/Output Devices

	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	50-dBA maximum sound pressure level
	Operating temperature	32° to 104° F (0° to 40° C)
	Non-operating temperature	-22° to 149° F (-30° to 65° C)
	Operating humidity	15% to 80% (non-condensing at ambient)
	Non-operating humidity	15% to 90% (non-condensing at ambient)
	Operating shock	N/A
	Non-operating shock	65 inch 2.9 ms, six surface; 30g 266 inch/second; 50g 266 inch/second six surface
	Operating vibration	2-g peak acceleration
	Non-operating vibration	Starting at 5 Hz, vary the frequency of vibration from 5 to 500 Hz and back to 5 Hz at a Logarithmic sweep rate of 1 octave per minute.
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	29.93 in (76 cm) on concrete, 16-drop sequence
Approvals	CUL, ICES-003 Class B, FCC, CE Mark,TUV GS, VCCI, BSMI, C-Tick, KC	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP USB Smart Card (CCID) Keyboard	
Key Benefits:	• Protects against unauthorized access with smart card technology • Delivers even greater security when combined with a HP ProtectTools smart card and the HP ProtectTools Security Software • Combination of username and password or pin with a smart card or security token • Secures online transactions using digital signatures and certificates • Conforms to industry standards for ease of setup and use • Delivers long product life and quiet operation with high-impact materials and lubricated keys • Spill drain feature

Technical Specifications - Input/Output Devices

Physical Characteristics	Keys	104, 105, 106, 107, 109 layout (depending upon country
	Form factor	USB basic smart card keyboard
	Colors	Carbonite/Silver
	Dimensions (H x W x D)	18.2 x 6.3 x 1.3 in (46.3 x 16.1 x 3.3 cm)
	Weight	2 lb (0.9 kg) minimum
Electrical	Operating voltage	+ 5VDC ± 5%
	Power consumption	100-mA maximum (with four LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	Languages	30+ available
	Keycaps	Standard design
	Switch actuation	55 g nominal peak force with tactile feedback
	Switch life	20 million keystrokes (using Hasco modified tester)
	Switch type	Contamination-resistant membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	6 ft (1.8 m)
	Microsoft PC 99 - 2001	Mechanically compliant
Environmental	Acoustics	43-dBA maximum sound pressure level
	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	-22° to 140° F (-30° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)
	Non-operating humidity	20% to 80% (non-condensing at ambient)

Technical Specifications - Input/Output Devices

	Operating shock	40 g, six surfaces	
	Non-operating shock	80 g, six surfaces	
	Operating vibration	2-g peak acceleration	
	Non-operating vibration	4-g peak acceleration	
	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence	
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence	
SmartCard Function	Support	All ISO 7816 smart cards (FIPS 201)	
	Interface	Reads from and writes to all ISO7816-1, 2, 3, 4 memory and microprocessor smart cards (T=0, T=1)	
	Chipset	SCM STCII	
	Standard APIs supported	PC/SC, EMV2000, SET	
	Power	USB Port	
		Short circuit detection (protects smart card and reader)	
		Power supply compliant with ISO7816 and EMV (5V, 60 mA)	
		Supports 3-V and 5-V cards	
	Power consumption	100-mA maximum draw	
	Communication	From card	9600 bps to 330,000 bps
		From computer	12 Mbps (USB transfer speed)
	Landing mechanism	Contact device	Friction contact
		Card insertions rating	Up to 100,000 insertion cycles
	Interface modes	CCID protocol	
	Reader performance interface	USB connection	
	Electro-magnetic standards	Europe	2004/108/EC

Technical Specifications - Input/Output Devices

		USA	USAFCC part 15
Approvals	CE-Mark, UL, CSA, FCC, CE Mark, TUV, TUV GS, VCCI, BSMI, C-Tick, MIC, EMV2000, USB-IF		
Ergonomic Compliance	ISO 9241-4, TUVGS		
Kit Contents	Keyboard, I/O Security and Documentation CD, warranty card		

HP USB PS/2 Washable Keyboard

Physical Characteristics	Keys	104 (US) Layout, 105 (EU) layout – depending upon country
	Dimensions (L x W x H)	17.67x 6.62 x 1.38 in (449 x 168 x 35 mm)
	Weight	1.7 lb (0.77 kg) minimum
Electrical	Operating voltage	+ 5VDC ±5%
	Power consumption	50-mA maximum (with three LEDs ON)
	System interface	USB Type A plug connector
	ESD	CE level 4, 15-kV air discharge
	EMI - RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC 99 - 2001	Functionally compliant
Mechanical	Keycaps	Stepped -profile design
	Switch actuation	55-g nominal peak force with tactile feedback
	Switch life	20 million keystrokes
	Switch type	Contamination-resistant switch membrane
	Key-leveling mechanisms	For all double-wide and greater-length keys
	Cable length	7 ft (2.2 m)
	Microsoft PC 99 - 2001	Mechanically compliant
	Acoustics	43-dBA maximum sound pressure level
Environmental	Operating temperature	50° to 122° F (10° to 50° C)
	Non-operating temperature	4° to 149° F (-20° to 65° C)
	Operating humidity	10% to 95% (non-condensing at ambient)
	Non-operating humidity	0% to 95% (non-condensing at ambient)
	Operating shock	40 g, six surfaces
	Non-operating shock	80 g, six surfaces
	Operating vibration	2-g peak acceleration
	Non-operating vibration	4-g peak acceleration

Technical Specifications - Input/Output Devices

	Drop (out of box)	26 in (66 cm) on carpet, six-drop sequence
	Drop (in box)	42 in (107 cm) on concrete, 16-drop sequence
Operating system support	Windows® 7, Windows Vista, Windows XP Professional	
Approvals	UL, cUL, FCC, CE, TUV GS, VCCI, BSMI, C-Tick, KCC, USB-IF, WHQL, EN/IEC 60601-1, IP66/NEMA4X	
Ergonomic compliance	ANSI HFS 100, ISO 9241-4, and TUVGS	

HP Wireless Keyboard and Mouse		
Keyboard	Dimensions (H x L x W)	1.09 x 18.1 x 6.47 in (27.87 x 460.3 x 164.3 mm)
	Weight – Without Two AA Alkaline Batteries	1.94 lb (880 g)
Mouse	Dimensions (H x L x W)	1.46 x 4.53 x 2.47 in (37 x 115 x 62.9 mm)
	Weight – Without Two AA Alkaline Batteries	0.15 lb (67 g)
Receiver	Dimensions (H x L x W)	0.33x 1.79 x 0.72 in (8.4 x 45.5 x 18.4 mm)
	Weight	0.21 oz (5.9 g)
	Cable Length – Minimum	6 ft (1.8 m)
	Range	32.8 ft (10 m)
System Requirements	Windows 7 Home Basic*, Windows 7 Home Premium*, Windows 7 Professional Edition 32*, Windows 7 Professional Edition 64*, Windows 7 Ultimate Edition 32*, Windows 7 Ultimate Edition 64* Windows Vista or Windows XP Available USB port for the receiver CD-ROM Drive *This system may require upgraded and/or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See **http://www.microsoft.com/windows/windows-7/** for details.	
Approvals	Product Safety	UL; CSA /TUV (Europe only); CE Mark; CB Report
	Ergonomics	ANSI; ISO (Europe only); GS Mark (Germany only)
	EMC	FCC; CE; ACA (-tick); BSMI; KC ; VCCI
	CE Mark	EN 55022:2010; EN 55024; EN 301489-1; EN 61000
	Design Guidelines for PCs	PC 99 – connector overmold colors; PC 2001 – full functionality
	Telecom	All local telecom requirements and approvals for intended markets
	USA	FCC Title 47 CFR, Par 15, Subpart C; other local requirements

Technical Specifications - Input/Output Devices

	Country Support	US, Belgium, Switzerland, Spain, Denmark, Netherlands, France, Germany, Italy, Portugal, Sweden, Norway, Finland, UK, Poland, Czech Republic, Turkey, Greece, Austria, Bulgaria, Cyprus, Estonia, Hungary, Ireland, Latvia, Lithuania, Luxemburg, Malta, Romania, Slovakia, Slovenia, Vietnam, HK, Australia, NZ, Malaysia, Singapore, Indonesia, Philippines, Thailand, Canada, China, Japan, Korea, Taiwan, India, Venezuela, Ecuador, Russia, Ukraine, Israel, Croatia, United Arab Emirates, Peru, Brazil, Chile, Argentina, Mexico, South Africa, and up to 193 countries worldwide.

HP PS/2 Mouse		
Dimensions (H x L x W)	1.46 x 2.48 x 4.53 in (3.70 x 6.29 x 11.50 cm)	
Weight	3.53 oz (100g; +10g/- 5 g)	
Environmental	Operating temperature	-32° to 104°F (0° to 40° C)
	Non-operating temperature	-4° to 140°F (-20° to 60° C)
	Operating humidity	10% to 90% (non condensing at ambient)
	Non-operating humidity	10% to 90% (non condensing at ambient)
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector

Technical Specifications - Input/Output Devices

	ESD	CE level 4, 15 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
Mechanical	Resolution	800 DPI
	Tracking speed	10 in/s (25.4 cm/s) maximum
	Acceleration	±15%
	Switch actuation	65±20 gf
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	80 km
	Cable length	6 ft (1.8 m)
	Microsoft PC99 - 2001	Mechanically compliant
Scroll wheel	Width	6 mm
	Diameter	22.5 ± 0.2 mm
	Maximum rotation force	50 gf-cm
	Switch type	Light force micro-switch
	Switch life	1 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	UL/cUL, FCC, CE Mark, TUV/GS, VCCI, KCC, BSMI, C-Tick	

HP USB Mouse	
Dimensions (H x L x W)	1.5 x 4.5 x 2.5 in (3.7 x 11.5 x 6.3 cm)
Weight	0.22 lb (0.10 kg)

Technical Specifications - Input/Output Devices

Cable length	70.9 in (180 cm)
System requirements	Available USB port

HP USB 1000dpi Laser Mouse		
Dimensions (H x L x W)	1.47 x 4.53 x 2.47 in (37.3 x 114.97 x 62.86 mm)	
Weight	3.360 oz (102g)	
Cable length	70.9 in (180 cm)	
System requirements	Available USB port	
Environmental	Operating Temperature	32° to 104° F (0° to 40° C)
	Non-operating Temperature	-4° to 140° F (-20° to 60° C)
	Operating Humidity	10% to 90% (non-condensing at ambient)
Mechanical	Resolution	1000dpi
	Tracking Speed	45 cm/sec
	Cable Length	70.9 in (180 cm)

HP USB PS/2 Washable Mouse		
Dimensions (H x L x W)	1.56 x 2.44 x 4.61 in (3.95 x 6.21 x 11.7 cm)	
Weight	4.44 oz (126 g)	
Environmental	Operating temperature	–32° to 104°F (0° to 40° C)
	Non-operating temperature	–4° to 140°F (–20° to 60° C)
	Operating humidity	10% to 90% (non-condensing at ambient)

Technical Specifications - Input/Output Devices

	Non-operating humidity	10% to 90% non-condensing
	Operating shock	40 g, 6 surfaces
	Non-operating shock	80 g, 6 surfaces
	Operating vibration	2 g peak acceleration
	Non-operating vibration	4 g peak acceleration
	Drop (out of box)	80 cm height onto asphalt tile over concrete or equivalent, 5-drop in 5 direction except the cable face
Electrical	Operating voltage	5 VDC ± 10%
	Power consumption	100mA
	System consumption	PS/2 mini-din connector or USB
	ESD	CE level 2 8 kV air discharge
	EMI-RFI	Conforms to FCC rules for a Class B computing device
	Microsoft PC99 - 2001	Functionally compliant
Mechanical	Resolution	1000 ± 20% DPI
	Tracking speed	14 in/s (35.56 cm/s) maximum
	Acceleration	2 g
	Switch actuation	70 g nominal peak force
	Switch life	3,000,000 operations (using Hasco modified tester)
	Switch type	Low force micro-switches
	Tracking mechanism life	8.8 ft total 70 cm+ 2m extension
	Cable length	Mechanically compliant

Technical Specifications - Input/Output Devices

	Microsoft PC99 - 2001	1000 ± 20% DPI
Scroll wheel	Width	6 mm
	Diameter	1 in (25.4 mm)
	Maximum rotation force	48 rats/sec
	Switch type	Light force micro-switch
	Switch life	3 million operations
	Mechanical life	Minimum 200,000 revolutions
Regulatory Approvals	FCC, CE Mark, ICES-003-B, IP66/NEMA4X	

Technical Specifications – Power

Unit Environment and Operating Conditions

General Unit Operating Guidelines

- Keep the computer away from excessive moisture, direct moisture and the extremes of heat and cold, to ensure that unit is operated within the specified operating range.
- Leave a 10.2 cm (4 in) clearance on all vented sides of the computer to permit the required airflow.
- Never restrict airflow into the computer by blocking any vents or air intakes.
- Do not stack computers on top of each other or place computers so near each other that they are subject to each other's re-circulated or preheated air.
- Occasionally clean the air vents on the front, back, and any other vented side of the computer. Lint, dust and other foreign matter can block the vents and limit the airflow.
- If the computer is to be operated within a separate enclosure, intake and exhaust ventilation must be provided on the enclosure, and the same operating guidelines listed above will still apply.

Temperature Range	Operating: 50° to 95° F (10° to 35° C)* Non-operating: –22° to 140° F(–30° to 60° C)
Relative Humidity	Operating: 10% to 90% (non-condensing at ambient) Non-operating: 5% to 95% (non-condensing at ambient)
Maximum Altitude (unpressurized)	Operating: 10,000 ft (3048 m) Non-operating: 30,000 ft (9144 m)

*Operating temperature is de-rated 1.0 deg C per 300 m (1000 ft) to 3000 m (10,000 ft) above sea level, no direct sustained sunlight. Maximum rate of change is 10 deg C/Hr. The upper limit may be limited by the type and number of options installed.

Power Supply

Standard Efficiency	300W active PFC (230 VAC input only)
High Efficiency* 80 PLUS Bronze	300W active PFC 82/85/82% efficient at 20/50/100% load (115V) 82/85/82% efficient at 20/50/100% load (230V)
Operating Voltage Range	90 - 264 VAC
Rated Voltage Range	200 - 240 VAC (300W active PFC) 90 - 240 VAC
Rated Line Frequency	50/60 Hz
Operating Line Frequency	47 – 63 Hz
Rated Input Current	4A
Rated Input Current with Energy Efficient* Power Supply	4A
Current Leakage (NFPA 99)	<900uA / 230Vac (300W PSU)

Technical Specifications – Power

Power Supply Fan	80mm Fan (300W PSU)
Power cord length	6.0 ft. (1.83 m)
External Power Adapter	
Dimensions	N/A
Total Cord Length	N/A

*High efficiency power supply is a requirement for ENERGY STAR® qualification in conjunction with a select range of processors and modules

Technical Specifications – Weights & Dimensions

Weights & Dimensions

(configured with 1 HDD & 1 ODD)

Chassis (W x H x D)	182.88 X 357 X 402 mm 7.2 x 14.05 x 15.82 in
System Volume	24.66 L
System Weight*	7.148 kg 15.75 lb
Max Supported Weight (desktop orientation)	N/A
Tower Stand (H x W x D)	N/A
Packaging (H x W x D)	535 X 289 X 500 mm 21.06 x 11.37 x 19.68 in
Shipping Weight	Est. = ~10.7 kg (packaged) ~23.58 lb
Palletization Profile	4-units per layer 8-layer max. 32-units per pallet

Technical Specifications – Miscellaneous Features

Management Features

- Advanced Configuration and Power Management Interface (ACPI). Allows the system to wake from a low power mode. Controls system power consumption, making it possible to place individual cards and peripherals in a low-power or powered-off state without affecting other elements of the system.
- Dual State Power Button; acts as both an on/off button and a suspend-to-sleep button

Serviceability Features

- Dual colored power LED on front of computer to indicate either normal or fault condition
- Diagnostic LED Explanation Table:
    - Number of 1-second red LED blinks followed by a 2-second pause, then repeats:
        - 2 - processor thermal protection activated
        - 3 - processor not installed
        - 4 - power supply failure
        - 5 -- memory error
        - 6 - video error
        - 7 - PCA failure (ROM detected failure prior to video)
        - 8 - invalid ROM, boot block recovery mode
        - 9 - system not fetching code
        - 10 - system hang while loading an option ROM
- HP PC Hardware Diagnostics UEFI:
    - This utility enables hardware level testing outside the operating system on many components. The diagnostics can be invoked by pressing F2 at POST, and is available as a download from HP Support
- System/Emergency ROM
- Flash ROM
- CMOS Battery Holder for easy replacement
- Flash Recovery with Video Configuration Record Software
- 5 Aux Power LED on System PCA
- Processor ZIF Socket for easy Upgrade
- Over-Temp Warning on Screen (Requires IM Agents)
- Clear Password Jumper
- DIMM Connectors for easy Upgrade
- Clear CMOS Button
- NIC LEDs (integrated) (Green & Amber)
- Dual Color Power and HD LED - To Indicate Normal Operations and Fault Conditions
- Color coordinated cables and connectors
- Tool-less Hood Removal
- Front power switch
- System memory can be upgraded without removing the system board or any internal components
- Tool-less Hard Drive, CD & Diskette Removal
- Green Pull Tabs, and Quick Release Latches for easy Identification

Additional Features

	Description
Towerable Orientation	Product can be oriented as either a desktop (horizontal) or a tower (vertical)
Drive Lock	Implementation of the industry standard ATA Security feature set. When enabled, it prevents software access to user data on the drive until one or two user-defined passwords are provided.

Technical Specifications – Miscellaneous Features

Drive Protection System	DPS Access through F10 Setup during Boot A diagnostic hard drive self test. It scans critical physical components and every sector of the hard drive for physical faults and then reports any faults to the user Running independently of the operating system, it can be accessed through a Windows-based diagnostics utility or through the computer's setup procedure. It produces an evaluation on whether the hard drive is the source of the problem and needs to be replaced The system expands on the Self-Monitoring, Analysis, and Reporting Technology (SMART), a continuously running systems diagnostic that alerts the user to certain types of failures
SMART Technology (Self-Monitoring, Analysis and Reporting Technology)	Allows hard drives to monitor their own health and to raise flags if imminent failures were predicted
SMART I - Drive Failure Prediction	Predicts failures before they occur. Tracks fault prediction and failure indication parameters such as re-allocated sector count, spin retry count, calibration retry count
SMART II - Off-Line Data Collection	By avoiding actual hard drive failures, SMART hard drives act as "insurance" against unplanned user downtime and potential data loss from hard drive failure
SMART III - Off-Line Read Scanning with Defect Reallocation	IOEDC: I/O Error Detection Circuitry Detects errors in Read/Write buffers on HDD cache RAM
SMART IV - End-to-End CRC for hard drives	Interface in F10 setup provides confirmation of SMART IV support.

After-Market Options (availability may vary by region)

Communication Devices

	Part Number
Intel Ethernet I210 – T1 Gbe NIC	E0X95AA
Intel 6205 802.11 a/b/g/n PCIe x1 NIC	E0X93AA

Graphics Solutions

	Part Number
AMD Radeon HD 8350 Graphics (PCIe x16)	E1C63AA
AMD Radeon HD 8490 Graphics Card	E1C64AA
Nvidia NVS 310 Graphics (PCIe x16)	A7U59AA
Nvidia NVS 315 Graphics (PCIe x16)	E1C65AA
HP DisplayPort Cable Kit	VN567AA
HP DisplayPort To Dual Link DVI-D Adapter	NR078AA
HP DisplayPort To DVI-D Adapter	FH973AA
HP DisplayPort to HDMI Adapter	BP937AA
HP DisplayPort to VGA Adapter	AS615AA
HP DMS-59 to Dual DVI Cable	DL139A
HP DMS-59 to Dual DisplayPort Adapter	XP688AA

Data Storage Drives and Accessories

	Part Number
HP 2TB 7200rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	
HP 1-TB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	QK555AA
HP 1-TB 10K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	C2T91AA
HP 500-GB 7.2K rpm SATA 6.0Gb/s 3.5” Hard Disk Drive	QK554AA
HP 128-GB SATA 3.0Gb/s Solid State Drive	QV063AA
HP 160-GB SATA 3.0Gb/s Solid State Drive	QV064AA*
HP 500-GB SATA 3.0Gb/s Solid State Hybrid Drive	E1C62AA
HP Slim Removable SATA Hard Drive Enclosure (frame & carrier)	C1N41AA
HP Slim Removable SATA Hard Drive Enclosure (carrier only)	AR639AA
HP Chassis (1bay) Security Kit	AR639AA

*Not available in all regions.

Input Devices

	Part Number
HP USB Keyboard	QY776AA
HP USB Gray Keyboard	B6B64AA
HP USB Smart Card (CCID) Keyboard	BV813AA
HP USB Keyboard and Mouse Kit	B1T09AA
HP USB Washable Keyboard	VF097AA
HP USB and PS/2 Washable Mouse	BM866AA
HP USB and PS/2 Washable Keyboard and Mouse Kit	BU207AA
HP PS/2 Mouse	QY775AA

After-Market Options (availability may vary by region)

HP USB Mouse	QY777AA
HP USB 1000dpi Laser Mouse	QY778AA
HP Wireless Keyboard and Mouse Combination	QY449AA

System Memory

	Part Number
HP 4GB DDR3-1600 (PC3-12800) DIMM	B4U36AA
HP 8GB DDR3-1600 (PC3-12800) DIMM	BU37AA

Multimedia Devices

	Part Number
HP Slim DVD-ROM Drive	VP033AA
HP Slim SuperMulti DVD Writer Drive	QS209AA
HP USB HD 720P v2 Business Webcam	D8Z08AA
HP Business Headset	QK550AA

Security Devices

	Part Number
HP SFF Wall Mount/Security Sleeve	VN570AA
HP UltraSlim Cable Lock	H4D73AA

Stands and Accessories

	Part Number
HP Integrated Work Center Stand (SFF)R	QP897AA
HP 405 Tower Bezel Kit	E1C66AA
HP Serial Port Adapter (RS-232 compatible)	PA716A
HP Parallel Port Kit	KD061AA
HP PCI Expansion Kit	E1V16AA

Business Monitors

	Part Number
HP ProDisplay P191	C9E54AA
HP ProDisplay P201	C9F26AA
HP ProDisplay P221	C9E49AA
HP EliteDisplay E201	C9V73AA
HP EliteDisplay E221	C9V76AA
HP EliteDisplay E231	C9V75AA
HP LA2405x	D0P36AA
HP EliteDisplay E271i	D7Z72AA
HP EliteDisplay E221c	D9E49AA
HP L2206tm	B0L55AA

After-Market Options (availability may vary by region)

LANDesk Software (E-Delivery)

Contact your HP representative for available options.

After-Market Options (availability may vary by region)

February 2014